

Amendments to the Claims

Listing of Claims

Claims 1-77 (canceled)

78. (currently amended) An apparatus for testing a semiconductor die having a plurality of pads comprising:

a plate;

a substrate on the plate comprising a surface and a plurality of contacts on the surface configured to electrically contact the pads; and

~~a clamping mechanism attached to biasing member on the plate~~ configured to bias the contacts and the pads together with a force;

~~the plate, the substrate and the mechanism biasing member~~ configured such that the die can be placed on the substrate, ~~the mechanism attached to the plate, and the die retained between the mechanism and biased against~~ the substrate with the contacts in electrical contact with the pads;

each contact comprising a bump on the substrate having a height on the surface and a plurality of raised portions dimensioned to penetrate into a pad to a penetration depth less than a thickness of the pad, the bump dimensioned to limit further penetration of the raised portions into the pad at the force.

79. (previously presented) The apparatus of claim 78 wherein the bump is dimensioned to penetrate into the pad at a second force which is greater than the force.

80. (currently amended) The apparatus of claim 78 further comprising a plurality of conductive traces on the substrate in electrical communication with the contacts, and a plurality of external ~~contacts~~ leads on the plate in electrical communication with the traces.

81. (previously presented) The apparatus of claim 78 wherein the substrate comprises silicon and the bump comprises metal.

82. (previously presented) The apparatus of claim 78 wherein the pads comprise bondpads.

Claim 83 (withdrawn)

Claims 84-86 (canceled)

87. (currently amended) An apparatus for testing a semiconductor die having a plurality of pads comprising:
a plate comprising a plurality of external leads;
a substrate on the plate comprising a surface and a plurality of contacts on the surface configured to electrically contact the pads; and
~~a clamping mechanism attached to biasing member on the plate configured to bias the contacts and the pads together with a force;~~
~~the plate, the substrate and the mechanism biasing member configured such that the die can be placed on the substrate, the mechanism attached to the plate, and the die retained between the mechanism and biased against the substrate with the contacts in electrical contact with the pads;~~

each contact comprising a bump on the substrate having a height on the surface and a plurality of spaced points on the bump configured to penetrate into a pad with a penetration depth less than a thickness of the pad while a remainder of the bump limits further penetration, the force selected to be greater than a first force at which the points penetrate the pad but less than a second force at which the remainder of the bump penetrates the pad.

88. (previously presented) The apparatus of claim 87 wherein the substrate comprises silicon and the bump comprises metal.

Claim 89 (canceled)

90. (currently amended) The apparatus of claim 87 wherein the bump comprises a second surface and the raised portions project from the second surface.

91. (currently amended) The apparatus of claim 87 further comprising a plurality of conductive traces on the substrate and a plurality of bond pads on the conductive traces.

92. (currently amended) An apparatus for testing a semiconductor die having a plurality of pads comprising:

a plate;
a substrate on the plate comprising a surface and a plurality of contacts on the surface configured to electrically contact the pads; and

~~a clamping mechanism attached to biasing member on the plate configured to bias the contacts and the pads together with a force;~~

~~the plate, the substrate and the mechanism biasing member configured such that the die can be placed on the substrate, the mechanism attached to the plate, and the die retained between the mechanism and biased against the substrate with the contacts in electrical contact with the pads;~~

~~each contact comprising a bump having a height on the surface and a plurality of spaced raised portions dimensioned to penetrate into a pad at the force by a penetration depth less than a thickness of the pad while the bump limits further penetration into the pad, the force selected to be greater than a first force at which the raised portions penetrate the pad but less than a second force at which the bump penetrates the pad.~~

93. (previously presented) The apparatus of claim 92 further comprising a plurality of external leads on the plate in electrical communication with the contacts.

Claim 94 (withdrawn)

Claim 95 (canceled)

96. (previously presented) The apparatus of claim 92 wherein the raised portions comprise points.

97. (currently amended) An apparatus for testing a semiconductor die having a pad with a thickness comprising:
a plate;

a substrate on the plate comprising a surface and a contact on the surface configured to electrically contact the pad, the contact comprising a bump having a height on the surface, a surface and a plurality of points comprising portions of the bump projecting therefrom, the surface, the points and the surface configured such that the points can penetrate into the pad to a penetration depth less than the thickness while the surface a remainder of the bump limits further penetration into the pad; and

a clamping mechanism attached to biasing member on the plate configured to bias the die and the substrate together with a force selected to achieve penetration of the pad by the points to the penetration depth.

98. (previously presented) The apparatus of claim 97 wherein the substrate comprises silicon and the bump comprises metal.